Behavior of *Leptalia macilenta* (Mannerheim), with a Description of the Pupa

(Coleoptera: Cerambycidae)

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During April 1970, field work in connection with the Field Entomology course of the University of California, Berkeley, resulted in the discovery of larval colonies of *Leptalia macilenta* (Mannerheim) at two localities in the central Coast Range of California. Observations were made on larval and pupation habits in the field and on adult behavior in the laboratory. At both sites larvae fed under bark of old *Umbellularia californica* (H. & A.) Nutt. (Lauraceae) logs, although conditions of the wood and habitat differed in several particulars between the two.

The first site is Lily Gulch, an east-running tributary of Alpine Lake, Marin County, where there is a permanent pond at about 800 feet elevation. Collections and observations were made on April 18 and again on April 22, when several sections of log were transferred to Berkeley, yielding the basis for most of the following data. The gulch is a narrow canyon forested primarily with *Sequoia*, *Pseudotsuga*, *Lithocarpus*, and *Umbellularia*. Riparian elements include *Acer*, *Cornus*, *Salix*, and a variety of less dominant forms. The gulch was spared when an extensive fire denuded the west side of the valley some 30 years ago, and subsequent succession has left Lily Gulch an island of redwood–douglas fir forest in an area which mostly recovered in manzanita brush. The tree which had been colonized by *Leptalia* was a standing, moss-covered snag of indeterminate age, perhaps dating back to the fire. Recently, probably within the past year, the upper section had fallen into the dry creek bottom, and our collections were made from this section. The wood was rotted, damp and "punky" in consistency with considerable fungus in the bark and surface wood and was currently occupied by larvae of Tipulidae, scardiine Tineidae, two genera of Lucanidae, and various other insects. The *Leptalia* galleries were located in the punky wood to a depth of 1–2 cm below the bark which was no longer easily discernible from the wood.

The second locality, visited a week later, is along Bates Creek, about 2.5 miles northeast of Soquel, Santa Cruz County. Here an excellent second growth redwood forest covers most of a narrow canyon at about 300 feet elevation in the southern edge of the Santa Cruz Mountains.

Although more heavily forested, with mature *Acer* and *Umbellularia* dominant along the creek, the canyon has several cleared areas with scattered *Ceanothus* as principal plant cover; and by contrast to the Marin County site, the immediate area of the *Leptalia* colony was much drier. The *Umbellularia* log appeared to have been cut within the past few years after a tree had fallen across a dirt road. Several upper sections were located in an open clearing on a dry, steep, east-facing slope, and the wood had dried without much fungus growth or insect borer activity. The bark was dry and loose on all but the undersides of the larger sections. The largest of these extended above the ground a foot or so at its lower end and retained sufficient moisture beneath the bark on the shaded portions to support cerambycids and other insects. The *Leptalia* galleries were all located just under the bark, adjacent to the sound wood.

Larval Habits and Pupation

After hatching, the larvae bore through and commence feeding under the bark. The galleries are irregular and filled behind with frass. In relatively dry, recent logs, the galleries are restricted to the bark-wood interface and affect the sound wood only by shallow scoring. In old, decayed logs such as at Lily Gulch, the nature of the wood makes it difficult to trace the galleries. In this case, as is the habit of many Lepturinae, *Leptalia* feeds on media that have been subject to previous decomposition by numerous other wood boring organisms. No definite cambium layer was left under the bark and most of the wood surface was covered by layers of frass from previous inhabitants.

Upon completion of feeding the larvae construct oval (about 6 × 15 mm) pupal chambers longitudinal with the grain of the wood. Examination of numerous chambers indicated that most were made directly under the bark in the old frass material. In some cases, however, the cell was built 2–3 mm below the wood surface. The end of the pupal cells is plugged by frass particles and the pupa is oriented with the head toward the opening.

At the time of our observations, most pupal cells contained either teneral adults or pupae. No larvae were seen within cells but a number of several different instars were collected under the bark. Many of the adults were ready for emergence and became active upon release from the pupal chamber. Observations on adult behavior were made in the laboratory on the freshly emerged beetles.

Mating Behavior

Several pairs of previously unmated adults were placed into a petri dish along with a piece of old bark of *Umbellularia*. Initially, the male made no efforts to attempt to mate. When placed into direct sunlight, individuals of both sexes became very active and the male immediately mounted the female. Joining followed at once as the phallus was inserted into the extruded genitalia of the female. The phallus was visible throughout the course of copulation. No "licking" action by the male was evident, but the palpi were in contact with the female's elytra behind the scutellum. The males legs were positioned as follows: front grasping the sides of the elytra behind the humeri; middle around the middle of the elytra; and the hind legs back on the substrate. The antennae of both beetles were held up and slightly out. After joining, the female remained motionless while the male gently bobbed his head up and down, twitched his antennae, and made slight movements with the abdomen. After these initial movements, both individuals remained motionless except for an occasional movement of the legs by the female. During mating the female cleaned her antennae several times by passing them through her mouthparts. The front legs were cleaned in the same manner and the middle pair by passing the front ones over them.

This same type of behavior sequence was observed in three different pairs under the same conditions. There appeared to be no deviation in mounting, joining, and movement. The three pairs remained joined for an average of 44.5 minutes (40, 44, 49) and in all cases, the male remained mounted for at least seven minutes after disjoining. One male maintained his position on the female even while she was ovipositing. When the female began moving, the male lifted his hind legs onto the sides of the female's elytra near the apex. When left undisturbed, the same pairs mated numerous times and the male remained in position on the female even when not joined.

Michelsen (1963, 1966a) observed and summarized the sexual behavior of a number of lepturine species. A comparison of the activities of the Palearctic species with those of *Leptalia* indicates little similarity. Most males of the former either "licked" the female or bit the antennae. This behavior was not observed in *Leptalia* and the actions during copula were also significantly different. On the basis of the observations made on the sexual behavior of *Leptalia*, it is difficult to integrate this behavior into the evolutionary system proposed by Michelsen (1966b).

Oviposition Behavior

Shortly after the cessation of copulation, the female *Leptalia* began searching for suitable oviposition niches. As she walked, the ovipositor was extruded and probed over the bark. When an acceptable crevice was located, the ovipositor was inserted into it and the egg deposited. The only apparent indication of this action was a gentle pulsing of the abdomen and slight to and fro motions of the body. The antennae apparently are not used in locating oviposition sites.

The eggs are elongate (about 1.5 × 0.5 mm), whitish, and rather translucent. Recovery of a number of eggs indicated that no sticky coating was present over the surface when laid.

Since Craighead (1923) included a complete larval description of this species, it will not be reproduced here. Known hosts include *Alnus* and *Salix* in addition to *Umbellularia*. Taxonomy and biology of *Leptalia* and related genera will be given elsewhere (Linsley and Chemsak, 1971).

Description of Pupa

Head with a long dark seta on each side at base of mandibles, two setae on each side of clypeus near base, and several on each side at bases of antennal tubercles. Pronotum faintly rugulose, apical edge with a row of sclerotized seta-bearing asperites, several also present on lateral tubercles; base of disk with a medially interrupted row of asperate setae, setae also present on sides at middle and toward the sides near base. Abdomen dorsally with acute, sclerotized, seta-bearing spines which increase in size posteriorly, these arranged three on each side of middle and one on each side a little above and nearer the middle, segments six and seven additionally with a spine on lateral margins near the base, eighth segment with a row of spines along posterior margin. Legs with several long setae at apices of femora.

Literature Cited

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